ASSESSMENT OF PCOS ON PSYCHOLOGICAL ATTRIBUTES AND PHYSIOLOGICAL STATE BETWEEN SPORTSWOMEN AND NON-SPORTSWOMEN

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Certificate

I hereby declare that the short synopsis **"Assessment of PCOS on Psychological Attributes and Physiological State Between Sportswomen and Non-Sportswomen"** being submitted in partial fulfilment of the requirement for the degree of Doctor of Philosophy in Physical Education under Department of Health Sciences of Lakshmibai National Institute Of Physical Education, Gwalior during the academic year 2022- 2023.

It is a bonafide record of original work carried out under the supervision of Dr. Sanjeev Yadav and has not been submitted in full or part to any other university or institute for a degree or diploma.

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Abstract

This research aims to assess the impact of Polycystic Ovary Syndrome (PCOS) on psychological attributes and physiological parameters among sportswomen and non-sportswomen in India, utilizing the Rotterdam diagnostic criteria. Recognizing the multifaceted nature of PCOS, which encompasses reproductive, hormonal, and metabolic disturbances, this study investigates how regular physical activity influences the manifestation and management of PCOS symptoms. The research also explores the interplay between hyperandrogenism, hirsutism, oligo-anovulation, self-esteem, and body image, alongside hormonal imbalances in active and inactive women. Employing a comprehensive methodology involving self-administered questionnaires, clinical assessments, and statistical analyses such as ANOVA and normality tests, the study aims to generate insights into the psychological and physiological differences attributable to sports participation. The findings are expected to enhance understanding of lifestyle interventions, inform targeted management strategies, and contribute to policy formulations addressing women's reproductive health and mental well-being in athletic and general populations. This research underscores the significance of physical activity as a modifiable factor influencing PCOS outcomes and aims to fill existing gaps in knowledge regarding the condition's prevalence and impact among Indian women.

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CHAPTER-I
INTRODUCTION

Women have been a crucial part of society to maintain balance and harmony, consideration of women as equal to men took centuries to cope with and get their rights. Now society has emerged into a class where everyone is alike. But even after years of change health of women has been less discussed and considered as men are considered.

Women have always tried to participate in society whether it is education, politics, executives, and the list is so on. Women's health is a major concern for society, as a mother is the key to a family looking after the needs of the family, they sometimes lack the nature of being self-obsessed and thus neglect personal health and keep it below everything. Women being the lucky birth giver sometimes bear a lot of complications related to reproductive health.

One such major problem related to women's reproductive health is PCOS, "Polycystic ovary syndrome (PCOS) is a widespread condition that afflicts 2-26% of adolescents and young women globally." (Taneja,2020). PCOS is prominently a disorder of endocrine glands and a problem related to metabolic disorders. (Bharali,2022)

PCOS commonly shows the symptoms of menstrual abnormalities and reproductive dysfunction, which further leads to infertility or the inability to conceive. Females having the sign and symptoms of PCOS are more prone to lifestyle diseases such as cardiovascular diseases, hypertension, lipid metabolic problems, obesity and endometrial cancer. There are various methods to diagnose and treat PCOS by the utilisation of available standardized tests and clinical approaches to meet the consequences of menstrual dysfunction, hyperandrogenism, and ovarian fibroids.

Comorbidities are developed sooner and chances of fertility increases in the later stages of the life in women who have prolonged health complications in regards of PCOS, hence increases the concerns of infertility by 70%. (Dokaras A et.al,2005)

The Olympics have been a keen centre of attraction when it comes to games and sports, and since the inception of the Olympics, there has been a rise in women players in the Olympics. In the Munich Summer Olympics in 1972, 15% of the total athletes were women, and with time this number grew to 44% in the 2012 London Olympics, and it is expected that in coming future, equal participation of women will be there in the Olympics.

Athletes' amenorrhea is due to central inhibition of the reproductive axis by the endorphins and sex hormones; reduced levels of energy availability and functional hypothalamic amenorrhea (FHA) are common causes of amenorrhea among exercising women. It is keen to note that all the women who pursue sports with menstrual disorders are hypometabolic. (Hagmar M et.al,2009) Women with PCOS tend to be more insulin resistant, which leads to hypersecretion of insulin, which functions to stimulate androgen production by the ovarian theca cells.

Specific treatment is not always necessary. However, a healthy lifestyle, including regular physical activity, is beneficial and should therefore be recommended first {Teede HJ, et.al,2018}. According to NIH diagnostic criteria, the revealed predominance of PCOS went from 6% to 9% in the United States, the United Kingdom, Spain, Greece, Australia, Asia, and Mexico (Wolf WM,2018}

Early assessment of the risk of PCOS may help in better controlling the disease and preventing its development.it is essential for Individuals to candidly assess the assessment of the PCOS so that management of their lifestyle can be incorporated at the earliest. The assessments can either be possible with the clinical test by the physician or be a preliminary assessment through online questionnaires.

This is a prime disease for a screening questionnaire. Screening test for PCOS is both specific and sensitive and has a high negative predictive value. Studies have shown the risk for children born to mothers with PCOS, including prematurity, intensive care unit admissions,19 attention-deficit hyperactivity disorder, and autism spectrum disorder.

It is shown in clinical assessment that 25% of women with unstable menses were not diagnosed with PCOS. Not all women with irregular menses have PCOS. Some factors, like sedentary habits, alcohol consumption, weight gain, psychosocial stresses, smoking, eating disorders, and excessive physical activity, can be predisposing factors.

Over time, the sonographic assessment has become the dominant indicator of PCOS and is often misinterpreted or overinterpreted as a de facto diagnostic test, usually ignoring the presence of a dominant follicle or corpus luteum. Now this raises the question of the aetiology of PCOD. various reasons have been proposed by many researchers, where they took into consideration mental health, mood swings, irritability, and others. The involvement of sportswomen at higher levels of tournaments have a tendency to use supplementations and diets which sometimes have a rich source of testosterone to build muscle and for the growth of the body of women, now the question which arises in mind is that what if levels of testosterone in the body will lead to hirsutism and thus is there a relation between the symptoms of hyperandrogenism and the Symptoms of PCOD are similar in the ways or does the body behave in a similar manner as in the case of a typical case of PCOD.

Statement of the Problem

The statement of the problem is stated as the Assessment of PCOS on psychological attributes and physiological state by Rotterdam criteria between sportswomen and non-sportswomen.

Objectives of the Study

The objectives of the study are:

1. To determine issues related to reproductive health among sportswomen.
2. To find the psychological state of sportswomen under the influence of PCOS.
3. To find the physiological issues of sportswomen and non-sportswomen having PCOS.
4. To determine the hormonal imbalance in women with PCOS.

Research Questions

Q. Does regular involvement in physical activities help in keeping reproductive health good for sportswomen?

Q. Is there a direct relation between psychological changes in women and PCOS?

Q. Is there a significant relationship between hirsutism and the level of self-confidence?

Q. What levels of oligo-anovulation are found in sportswomen by Rotterdam criteria?

Q. What difference do sportswomen and non-sports women show with PCOS?

Delimitations

1. The study will be delimited to sportswomen and non-sportswomen from different states of India.
2. The study will be further delimited to sportswomen from physical education colleges and sports academies.
3. The age ranged between 18-30 years for this study.
4. The study will be delimited to the assessment of oligo-anovulation in selected females
5. The study will be delimited to the assessment of hyperandrogenism or hirsutism in selected females
6. The study will be delimited to assess psychological attributes, i.e., self-esteem.
7. The study will be further delimited to random non-sportswomen.

Limitations

- There is no measure to determine whether the subject has shown their full honesty while filling out the Questionnaire for the diagnosis of PCOS and Self-esteem.

Hypothesis

H1: - There will be a significant relation between hirsutism and low level of self-esteem

H2: - There will be a significant relation between oligo-anovulation and the level of PCOS.

H3: - There will be a significant relation between increased androgen levels in sportswomen and symptoms of PCOS.

H4: - There will be a significant difference between active sportswomen and non-sports women's psychological attributes.

H5: - There will be a significant difference between active sportswomen and non-sportswomen's physiological state.

H6: - There will be a significant relationship between obesity and the PCOS of the sportswomen and non-sportswomen.

Definition & Explanation of Terms

1. **Polycystic Ovarian Disease (PCOD):** PCOD, often referred to as Stein-Leventhal syndrome, is a prevalent hormonal and metabolic condition affecting women's reproductive systems. It often impacts women of reproductive age and is marked by several symptoms associated with hormonal imbalance. According to Bharali et al. (2022), this condition may result in numerous health complications, such as infertility, obesity, and metabolic syndrome, which exacerbate psychological distress, diminish quality of life, and adversely impact health outcomes for women.

2. **Hirsutism:** Hirsutism denotes the occurrence of abundant, coarse, and dark hair in women in regions traditionally more responsive to androgens, including the face, chest, back, and belly. This illness can profoundly impact emotional well-being and self-assurance. (American Family Physician, 2005). Hirsutism, in conjunction with other manifestations of PCOS, may exacerbate anxiety and sadness, thereby further degrading the quality of life for affected women. Obtaining medical treatment and assistance from healthcare professionals is essential for managing hirsutism and its related impacts on mental health. Alongside medical therapies, therapy and counselling can be advantageous in assisting women with hirsutism in managing the emotional issues they may encounter. Women with PCOS or hirsutism should prioritise self-care and self-compassion to enhance their overall well-being and quality of life.

3. **Hyperandrogenism:** This disorder involves the excessive production of androgens, which are predominantly found in males but exist in lesser quantities in females. The excessive presence of androgens in women can lead to a variety of medical problems and is often associated with hormonal issues. (American Academy of Dermatology Association, 2021). Hyperandrogenism can exacerbate the symptoms of PCOS, leading to physical manifestations such as hirsutism and psychological issues including anxiety and diminished self-esteem, which impact women's quality of life.

4. **Oligo-Anovulation:** Oligo-anovulation refers to infrequent or non-existent ovulation, typically

signalled by irregular menstrual periods that occur less frequently than every 35 days or more frequently than every 21 days. It is a significant contributor to infertility and typically arises from hormonal imbalances. Therapeutic interventions generally encompass pharmacological agents or modifications in lifestyle. Cleveland Clinic. Effective management is essential for enhancing women's reproductive health and overall welfare since hormonal imbalances can markedly elevate the quality of life for women suffering from hirsutism and other symptoms related to PCOS.

5. Self-esteem: Self-esteem denotes the manner in which individuals perceive and appraise themselves, incorporating both favourable and unfavourable self-evaluations. Rosenberg (1965) defines it as an individual's comprehensive self-perception, whereas Alesi et al. (2012) characterise it as a psychological attribute influenced by personal values and views towards mankind. Self-esteem may also be affected by external variables, including social interactions, cultural standards, and media influences. It significantly influences an individual's emotions, behaviour, and overall well-being.

Significance of the study

- The study will find out whether sportswomen also have reproductive issues.
- The study will find out whether the occurrence of PCOS is not only because of physical inactivity.
- The study will find out various psychological disturbances due to PCOS.
- The study will find out the factors to diagnose the symptoms of PCOS.
- The study will find out various hormonal imbalances and their effects on sports performance.
- The study will find out the effect of increased male hormones on unwanted growth in women.

CHAPTER-Ⅱ

Review of Literature

Smet Elisabeth. et.al (2018) stated that the Rotterdam criteria for the determination of the symptoms of PCOD is the ultimate criteria for understanding it on a minute basis. The study discusses that if any of the two given criteria out of three are fulfilled, then it can be declared as direct symptoms of PCOD. For this purpose, a meta-analysis was done to determine the effectiveness of the Rotterdam criteria.

Bharali et.al (2022), stated that Stein-Leventhal syndrome, often known as polycystic ovarian syndrome (PCOS), is a syndrome that affects women's reproductive health. PCOS is one of the most common endocrine and metabolic disorders in women of reproductive age. The etiology of PCOS remains unknown mainly, and the estimation of PCOS burden in a specific geographical location will impact disease control strategies. Hence, this study estimated the pooled prevalence of PCOS in Indian women. Databases such as PubMed, CINHAL, Scopus, and Google Scholar were thoroughly searched. Only those published Indian studies that reported the prevalence of PCOS from 2010 to 2021 and had at least one of the following diagnostic PCOS criteria were included in the systematic review: the National Institutes of Health (NIH), Rotterdam's criteria, Out of 17132 articles, 11 articles were selected for systematic review and meta-analysis. The pooled prevalence of PCOS was 11.33(7.69-15.59) using the random effect. The proportion of Hirsute using the Ferriman-Gallwey score was highly variable, ranging from 1.6% to 37.9% (n=6). The prevalence rate of PCOS is high among Indian women. The pooled prevalence of PCOS was close to 10% using Rotterdam's criteria and AES criteria, while it was 5.8% using NIH criteria. The study's overall finding emphasizes the need for more acceptable and uniform diagnostic criteria for screening PCOS. At the same time, policy-makers should consider giving more importance to PCOS in their effort to control non-communicable diseases.

Bedrick et.al (2020), stated Polycystic ovary syndrome (PCOS) is a common yet underdiagnosed endocrinopathy with potentially serious sequelae. The survey included questions regarding menstrual cycle characteristics and hyperandrogenism as measured by images from the Ferriman-Gallwey (FG) scoring system, and by report of depilatory practices. Fifty-one women with PCOS and 50 women without PCOS participated in this study. Many study participants were current users of hormonal contraceptives making it difficult to discern menstrual cycle characteristics. Hirsutism, defined by a modification of the FG score of ≥3 from the upper lip and abdomen based on self-assessments, provided a sensitivity of 76% and specificity of 70%, whereas report of any depilatory practices provided a sensitivity of 71% and specificity of 74%. In multivariate logistic regression, women who used depilatory techniques had an adjusted odds ratio (aOR) of PCOS of 6.6 (95% confidence interval [CI] 2.5-17.3, p = 0.0002).

Taneja et.al (2020) stated that Polycystic ovary syndrome (PCOS) is a growing morbidity in young women globally. This disease has an association with several exogenous factors like irregularity of menses, hirsutism, and obesity. Very few standardized self-assessment tools based on easily observable factors are available for use in the Indian population, which can help them to assess their PCOS risk accurately. Undergraduate women of the age group 18-22 years enrolled in a university campus participated in the survey questionnaire. Nineteen questions with binary answers as "yes" or "no" were used for self-assessment test. Each "yes" was scored as one mark, and each "no" scored as zero, leading to the maximum score of 19. Scores of the women with irregular menses (test group) were compared to those of regular menses (control group). Welch's corrected t-test was used to calculate the significance at 5% between the groups. The clinical assessment confirmed the presence or absence of PCOS condition. One thousand and fifty-four women participated in the study. The study showed that 262 (24.8%) of young women reported irregular menstrual cycle. The average total score of the control group was 3.07±2.35, whereas that of the women with irregular menses was 5.93±2.86. 21 out of 28 participants, who scored high, were diagnosed with PCOS, on clinical assessment by Rotterdam criteria. The self-assessment test can assess the risk of PCOS. This test has 75% sensitivity and accuracy in predicting the presence of PCOS.

Teede et.al (2018), explains international evidence-based guidelines, including 166 recommendations and practice points, addressed prioritized questions to promote consistent,

evidence-based care and improve the experience and health outcomes of women with PCOS. Previous guidelines either lacked rigorous evidence-based processes, did not engage consumer and international multidisciplinary perspectives, or were outdated. Diagnosis of PCOS remains controversial, and assessment and management are inconsistent. The needs of women with PCOS are not being adequately met and evidence-practice gaps persist.

Fauzia Tabassum et. al (2021) assess the cause of mental distress affecting health–related quality of life (HRQOL) by physical appearance, menstrual irregularities, infertility combined said as Polycystic Ovary syndrome (PCOS). It was a case study conducted on 100 cases of PCOS and 200 healthy control cases who were attending tertiary care at AIMS, Patna. The tool was a pre-validated questionnaire having Short Form Health Survey-36 which measures the impact of PCOS on women. The multivariate statistic was used to analysed the data. There was a significantly decreased HRQOL shown by the PCOS cases. The PCOS cases were significantly altered by higher age of menarche, irregular/delayed menstrual history, and absence of child than healthy control cases. There was also a significant difference in the number of children, frequency of pregnancy, and miscarriage observed higher in PCOS cases compared to healthy control cases. Also, there was a significant difference in age, BMI, educational and marital status including the domain of SF-36 of PCOS cases and healthy control. The overall study shows that increased BMI, menstrual irregularities, educational status, and marital status play an important role in lowering the HRQOL in PCOS patients.

Brenda Bruner et. al (2006) assess the effect of exercise and nutritional counselling on the hormonal, menstrual, and reproductive health of patients with PCOS. 12 females with PCOS were selected randomly. A pilot study was done with 12 weeks of experiments on endurance and resistance exercise plus nutritional counselling (EN) or nutritional counselling only (N). The variables were Anthropometry, resting metabolic rate (RMR), selected hormones, and ovarian follicle population were measured pre- and post-intervention. To analyse the result descriptive statistics and t-test were computed. The study showed a significant decrease in the sum of 2 skinfolds and a greater increase in VO2 max. The study finds a greater decrease in waist girth and insulin levels. The study finds no significant change in hormones but an improvement in hormone function. The overall study indicates that exercise and nutritional counselling may benefit the metabolic and reproductive abnormalities associated with PCOS.

C. K. Welt et. al (2006) examined the women in the PCOS subgroups defined with Rotterdam criteria and phenotype characteristics were compared. Four subgroups were made:1) polycystic ovary morphology (n=298), 2) irregular menstruation with hyperandrogenism (n=7), 3) hyperandrogenism with polycystic ovary morphology (n=77), and 4) irregular menstruation with polycystic ovary morphology (n=36). The study was observational and purposive sampling was done. The variables which were tested through fasting blood samples were androgen by Ferriman Gallwey scale, metabolic parameters, and uterus transvaginal ultrasound. The correlation statistics were done to analyse the data. Ninety-seven percent of women with IM/HA had PCOM. The Ferriman-Gallwey score and androgen levels were highest in the hyperandrogenic groups (IM/HA and HA/PCOM). Body mass index and insulin levels were highest in the IM/HA subgroup. The study revealed that the subjects with PCOS defined by IM/HA are the most severely affected women based on androgen levels, ovarian volumes, and insulin levels.

Mohd Ashraf Ganie et. al (2019) assess the effect of the plant-based diet and animal-origin diet on serum markers of inflammation. The observational case-control study was done and purposive sampling was done to select the samples. Vegetarian women from Delhi: 82 with PCOS & 179 healthy and non-vegetarian women from Srinagar: 62 with PCOS & 141 healthy, their age range between (18-40 years). The biochemical analyser tool was used to examine TSH, LH, FSH, testosterone, and insulin. One-way ANOVA, Mann Whitney U test for checking normality, t-test, Kolmogorov Smirnov test, and descriptive statistics were used to analyse data. LH, FSH, and Triglycerides were higher in non-vegetarian PCOS women. Testosterone levels were higher in PCOS women when compared to healthy women. The study reveals higher pro-inflammatory markers among PCOS women from both centres. The study also reveals a higher level of pro-inflammatory markers in non-vegetarian PCOS women.

CHAPTER-Ⅲ

RESEARCH METHODOLOGY

In this chapter, the selection of subjects, selection of variables, criterion measures, administration of test, collection of data and statistical technique applied will be described.

Selection of the Participants:

The random sampling method will be applied for the selection of participants and collection of data and their age range is between 18-30 years. The participants for the study will be taken sportswomen from India, who are active in sports. The random sampling method will be used for the selection of non-sportswomen.

Selection Of Variables:

- Oligo-anovulation.
- Hyperandrogenism/ hirsutism
- Self-esteem

Criterion Measures:

1. Questionnaire for determination of Oligo Anovulation and Polycystic ovary (reliable questions are asked).

2. 10 questions for the determination of hirsutism by the Ferriman-Gallwey scale will be asked.

3. 10 questions for the determination of Self- esteem by Rosenberg Scale.

Reliability Of Data:

Data reliability will be assured by establishing the tester's competency, instrument

reliability, test reliability, and subject reliability.

A. Instrument's Reliability

The following tools will be used to obtain reliable measurements: A self-administered questionnaire for Oligo anovulation, Polycystic ovary, and the Ferriman Gallwey scale for hyperandrogenism. The research scholar will ensure the efficiency and reliability of the instruments.

B. Tester Reliability

To ensure that the investigator shall well acquainted with the test technique, the investigator has several questionnaires filled with peer scholars to review the mistakes. Furthermore, the data will be taken by the expert research scholar with her colleagues, who will also well acquainted with the test and testing procedures.

Tools And Equipment

The following tools and equipment will be used for the study:

1. A self-administered questionnaire will include 19 questions for the determination of Oligo Anovulation or irregular menstruation.

2. 10 questions for the determination of hirsutism by the Ferriman-Gallwey scale will be asked.

3. Self-esteem questionnaire by Rosenberg scale questionnaire.

Administration Of Test:

To test the various variable involved in the determination of symptoms of Polycystic Ovary Syndrome, the questionnaire will be randomly distributed among the sportswomen of the various sports college and non -sportswomen of India.

Collection Of Data:

The data will be taken individually from every single participant by making them fill out the 3-questionnaire on hard paper and an online Google form. A total of 1000 participants will be included, 500 non-sportswomen and 500 Sportswomen.

Data Analysis:

To analyse the data and to find out the significant difference between non-sportswomen and sportswomen, One-Way ANOVA will be used, to compute the percentage of women with PCOS will be done by descriptive analysis method. To determine the Normality of data Shapiro-Wilk test will be used. To determine the variability of data by Levene's test will be used to analyse the data at the level of significance set at 0.05 by computing in SPSS.

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